

Claims

1. Modified perfluoroplastics, comprising perfluoropolymers modified under the influence of oxygen radiation-chemically or plasma-chemically, the surfaces of which simultaneously have –COOH and/or –COF groups and reactive perfluoroalkyl-(peroxy-) radical centers, whereby additional low-molecular and/or oligomeric and/or polymeric substances and/or olefinically unsaturated monomers and/or olefinically unsaturated oligomers and/or olefinically unsaturated polymers or mixtures thereof are coupled via some or all of the groups and/or to some or all of the centers.
2. Modified perfluoroplastics according to claim 1, in which the perfluoropolymer is radiation-chemically modified under the influence of oxygen.
3. Modified perfluoroplastics according to claim 2, in which the perfluoropolymer is radiation-chemically modified with a radiation dose of more than 50 kGy.
4. Modified perfluoroplastics according to claim 2, in which the perfluoropolymer is radiation-chemically modified with a radiation dose greater than 100 kGy.
5. Modified perfluoroplastics according to claim 1, in which PTFE is used as perfluoropolymer.
6. Modified perfluoroplastics according to claim 1, in which the following reactions are radical reactions and/or substitution reactions and/or addition reactions.
7. Modified perfluoroplastics according to claim 6, in which olefinically unsaturated monomers and/or olefinically unsaturated oligomers or olefinically unsaturated polymers are coupled to the reactive perfluoroalkyl-(peroxy-) radical centers through (co-) polymerization and/or through grafting.

8. Modified perfluoroplastics according to claim 6, in which substance(s) are coupled to the ester and/or amide bonds formed via reactions with the -COOH and/or -COF groups.
9. Modified perfluoroplastics according to claim 8, in which at least one additional functional group is bonded to the substance(s) that are coupled via ester and/or amide bonds.
10. Modified perfluoroplastics according to claim 6, in which via reactions with the -COOH- and/or -COF groups, aliphatic amino compounds and/or aromatic amino compounds and/or alkylaryl-amino compounds are coupled to at least one further primary and/or secondary amino group or at least one further reactive or reactively modifiable or reactively activatable functional group.
11. Modified perfluoroplastics according to claim 10, in which as further reactive or reactively modifiable or reactively activatable functional group carboxylic acid anhydride, carboxylic acid anhydride derivative, which can also be recycled as dicarboxylic acid and/or carbonic half-ester compound to anhydride, -COOH, -CO-halogen, -COOR, -CO-OOR, -O-CO-OR, -SO<sub>3</sub>H, -SO<sub>2</sub>NRR\*, -SO<sub>2</sub>N<sub>3</sub>, -SO<sub>2</sub>-halogen, aliphatic and/or aromatic -OH, aliphatic and/or aromatic -SH, (meth-)acrylic ester, allyl and other olefinically unsaturated polymerizable compounds and/or polymers, cyanohydrin, -NCO, -NH-CO-OR, -NH-CS-OR, -NR\*-CO-NR\*\*R\*\*\*, -N\*-CS-R\*\*R\*\*\*, -CHO, -COR are coupled, whereby R, R\*, R\*\* and/or R\*\*\* mean alkyl-X<sub>m</sub>, aryl-X<sub>n</sub> or alkyaryl-X<sub>o</sub> or whereby R, R\*, R\*\* and/or R\*\*\* bonded to N can also mean H, and whereby X mean the same or also different functional groups and with m, n and o mean with numbers greater than/equal to 0.
12. Modified perfluoroplastics according to claim 6 in which olefinically unsaturated monomers and/or olefinically unsaturated oligomers or olefinically unsaturated polymers are coupled to the reactive perfluoroalkyl-(peroxy-) radical centers by (co-)polymerization and/or

by grafting and substance(s) are coupled to the ester and/or amide bonds produced via reactions with the –COOH and/or –COF groups and via reactions with the –COOH- and/or –COF groups, aliphatic amino compounds and/or aromatic amino compounds and/or alkylaryl-amino compounds are coupled to at least one further primary and/or secondary amino group or at least one further reactive or reactively modifiable or reactively activatable functional group.

13. Method for producing modified perfluoroplastics according to at least one of claims 1 through 12, in which perfluoropolymers radiation-chemically or plasma-chemically modified under the influence of oxygen, which perfluoropolymers simultaneously exhibit –COOH and/or –COF groups and reactive perfluoroalkyl-(peroxy-) radical centers, are reacted with low-molecular and/or oligomeric and/or polymeric substances and/or olefinically unsaturated monomers and/or olefinically unsaturated oligomers and/or olefinically unsaturated polymers by means of substitution reactions and/or by means of addition reactions and/or by means of radical reactions.
14. Method according to claim 13, in which the perfluoropolymers are radiation-chemically modified.
15. Method according to claim 13, in which the perfluoropolymers are radiation-chemically modified with a radiation dose greater than 50 kGy.
16. Method according to claim 13, in which the perfluoropolymers are radiation-chemically modified with a radiation dose greater than 100 kGy.
17. Method according to claim 13, in which as perfluoropolymer PTFE is used in compact or powder form.
18. Method according to claim 13, in which the radiation-chemically modified perfluoropolymer powder is treated through subsequent

tempering at low temperatures yielding the -COF groups and the reactive perfluoroalkyl-(peroxy-)radical centers.

19. Method according to claim 18, in which the radiation-chemically modified perfluoropolymer powder is treated by subsequent tempering with humid air.
20. Method according to claim 13, in which the radiation-chemically modified perfluoropolymer is reacted with reactive perfluoroalkyl-(peroxy-) radical centers with olefinically unsaturated monomers and/or olefinically unsaturated oligomers and/or olefinically unsaturated polymers. ,
21. Method according to claim 13, in which the -COOH and/or -COF groups are reacted at temperatures >150°C with low-molecular and/or oligomeric and/or polymeric substances that contain primary and/or secondary amino groups and/or hydroxy groups and/or amide groups and/or urea groups and/or isocyanate groups and/or blocked/protected isocyanate groups and/or urethane groups and/or uretdione groups, with at least one other functional group in the (macro-) molecule, which are capable of chemical consecutive reactions.
22. Method according to claim 21, in which the -COOH and/or -COF groups are reacted at temperatures >150°C in a reaction with low-molecular and/or oligomeric and/or polymeric substances that contain primary and/or secondary amino groups and/or hydroxy groups, with at least one other functional group in the (macro-) molecule, which are capable of chemical consecutive reactions.
23. Method according to claim 13 in which the -COOH and/or -COF groups are reacted at temperatures >150°C in a reaction with low-molecular and/or oligomeric and/or polymeric substances that contain hydroxy groups and/or epoxy groups, with at least one other functional group in the (macro-) molecule, which are capable of chemical consecutive reactions.

24. Method according to claim 13, in which the -COF groups are reacted with a lactam compound or an alcohol compound.
25. Method according to claim 13, in which the -COOH and/or -COF groups are reacted at temperatures  $\geq 200^{\circ}\text{C}$  with low-molecular and/or oligomeric and/or polymeric substances that contain amide groups and/or urea groups and/or isocyanate groups and/or blocked/protected isocyanate groups and/or urethane groups and/or uretdione groups, with at least one other functional group in the (macro-) molecule, which are capable of chemical consecutive reactions.
26. Method according to claim 13, in which the radiation-chemically modified perfluoropolymer powder is reacted with reactive perfluoroalkyl-(peroxy-)radical centers with olefinically unsaturated monomers and/or olefinically unsaturated oligomers and/or olefinically unsaturated polymers, and the -COOH and/or -COF groups are reacted at temperatures  $> 150^{\circ}\text{C}$  with low-molecular and/or oligomeric and/or polymeric substances that contain primary and/or secondary amino groups and/or hydroxy groups and/or amide groups and/or urea groups and/or isocyanate groups and/or blocked/protected isocyanate groups and/or urethane groups and/or uretdione groups, with at least one other functional group in the (macro-)molecule, which are capable of chemical consecutive reactions, or the -COOH and/or -COF groups are reacted at temperatures  $> 150^{\circ}\text{C}$  in a reaction with low-molecular and/or oligomeric and/or polymeric substances that contain hydroxy groups and/or epoxy groups, with at least one other functional group in the (macro-)molecule, which are capable of chemical consecutive reactions, or the -COF groups are reacted with a lactam compound or an alcohol compound.